

## Open FOA Project Highlight: Direct Wafer: Enabling Terawatt Photovoltaics

Lead Organization	1366 Technologies, Inc. (Lexington, MA)
Award Amount	\$4,000,000
Period of Funding	3/1/2010 to 8/31/2011
Primary Industry Area of Technology	Solar Photovoltaics / Thermal

The development team at 1366 Technologies, Inc., headquartered in Lexington, Massachusetts, is working on turning sunlight directly into low cost electricity through its innovative Direct Wafer technology. To date, the deployment of solar power has been limited by its high cost relative to other power sources. With ARPA-E's support, 1366 Technologies is developing a novel solar wafer manufacturing process that plucks wafers directly from molten silicon, dramatically cutting solar wafer cost. If successfully developed, 1366 estimates this technology could cut the cost of silicon wafers by 80 percent, cutting the cost of solar power in half from \$0.15 per kilowatt hour today to less than \$0.07 per kilowatt hour by 2020. Such a large drop in cost would bring solar power closer to parity with coal power, which currently generates 45 percent of U.S. electrical power. This improvement could increase U.S. solar electricity generation from 640 MW in 2009 to up to 500,000 MW in 2025—an amount of power generation capacity equal to almost half (45%) of what the total generation capacity in the U.S. was in 2009.

### WHY THIS INNOVATION IS IMPORTANT FOR THE UNITED STATES

Most of the solar panels bought and installed today are foreign-made, primarily from Asia. If this technology comes to fruition as planned, the United States could become a solar wafer exporter, capturing a large portion of the \$10 billion per year silicon wafer market. Direct Wafer's projected 80 percent cost reductions, low capital requirements, and compatibility with the existing supply chain will facilitate rapid commercialization that could create more high paying U.S.-based jobs.

### PROJECT NEWS

Since being awarded an ARPA-E grant of \$4 million to develop its new wafer-making technology, 1366 Technologies has been able to increase its number of employees and complete a furnace that is now producing industry standard, full-size silicon wafers. Based on the success of its new wafer process, 1366 Technologies was able to raise more than \$30 million in equity investments from new and existing investors as well as from two interested customers. Now the company is planning to break ground on a commercial manufacturing plant this year, near its R&D facilities in Massachusetts, to supply its first customers with 20 MW per year of wafers.



U.S. Department of Energy Secretary, Dr. Steven Chu, and ARPA-E Director, Dr. Arun Majumdar, visit 1366 Technologies to learn about the company's innovative Direct Wafer technology that could reduce the cost of solar panels by 80 percent. Source: Department of Energy